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# THE BRYOLOGIST

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## FURTHER NOTES ON CLADONIAS. VIII.

### **Cladonia botrytes, Cladonia caespiticia, and Cladonia delicata.**

BRUCE FINK.

There may be considerable doubt about a very close relationship between the species considered in this paper and those disposed of in the last one (BRY. 9, July, 1906), and it may also be doubted whether the first species to receive consideration below stands very near to the second and third. Both Tuckerman and Wainio have placed *Cladonia caespiticia* and *Cladonia delicata* in close relationship, but both have seen fit to remove *Cladonia botrytes* far from these. Nor have these authors placed *Cladonia botrytes* near *Cladonia mitrula*, to which species it bears enough of superficial resemblance so that one might easily pass the former species over as a small form of the latter, growing on wood. However, the *Cladonias* exhibit a most bewildering series of relationships, combining the various species in an inextricable network, and all arrangements must be regarded as more or less artificial. Doubtless the words of Dr. L. M. Underwood, regarding a similar difficulty in the classification of the *Agaricales*, or gill fungi, apply here, as follows:—"A part of the difficulty, however, is due to the fact that we have here an extensive evolution of comparatively recent origin in which very many of the steps of the progression are still in existence" (Moulds, Mildews and Mushrooms, p. 129). Again, both Tuckerman and Wainio give considerable prominence to the paler fruit, in removing *Cladonia botrytes* far from *Cladonia mitrula*. However remotely related the two species may be, the difference in color can have little weight in determining.

But passing the first species considered below, we are on surer ground, lichenists generally admitting the close relationship of the other two species and that of both of these to *Cladonia squamosa*, which species we will consider in the next paper of this series.

Finally, the writer is willing to let comparisons of the two descriptions, and better the study of specimens, speak further for the relationship of *Cladonia botrytes* and *Cladonia mitrula*, the latter description to be found in the last paper of this series and the former to follow immediately.

CLADONIA BOTRYTES (Hag.) Willd. Fl. Berol. 365. 1787.

Primary thallus commonly persistent, composed of crenate, incised or variously lacinate, flat, involute or rarely convex, commonly ascending, scattered or rarely clustered squamules, which are 1-3 mm. long and of about the same width, sea-green varying toward straw-colored or olivaceous above and white below, sometimes sparsely sorediate or granular. Podetia arising from the surface of the squamules, 2-18 mm. long, rather slender, cylindrical,

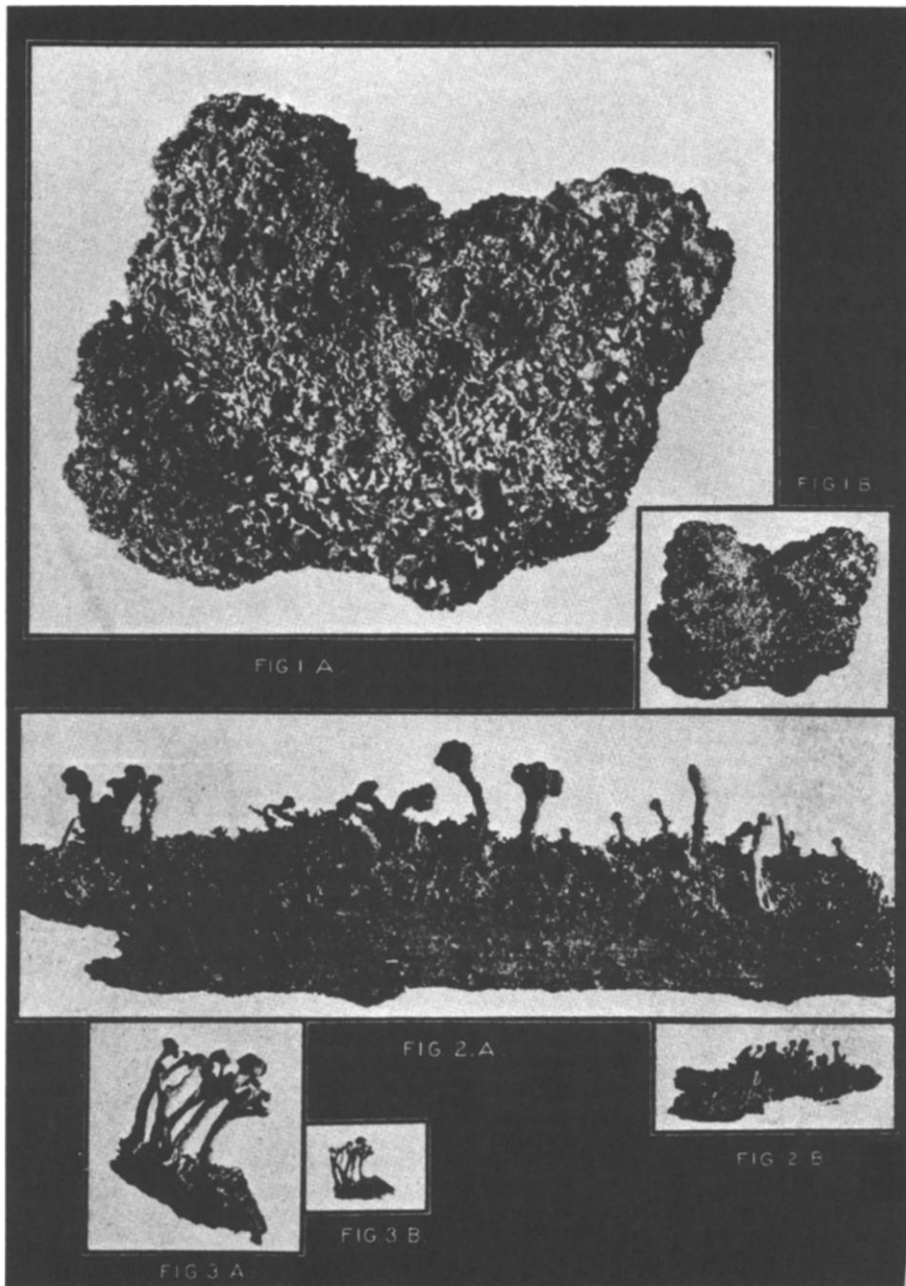


PLATE VIII.—Fig. 1 A, *C. caespiticia*  $\times 3$ . B. Natural size. Fig. 2 A, *C. delicata*  $\times 3$ . B. Natural size, Fig. 3 A, *C. botrytes*  $\times 3$ . B. Natural size.

or subcylindrical, rarely and abortively scyphiform, variously branched toward the apex or simple, or rarely branched toward the base, the branches commonly short or very short, the sides frequently rimose, the axils sometimes open, solitary or in groups, erect or variously curved or flexuous, cortex verrucose or divided into rather small areoles, which are contiguous or scattered, sometimes more or less squamulose, especially towards the base, varying from straw-colored to sea-green, or the decorticate portions straw-colored or whitish. Apothecia terminating all of the podetia or branches, small or rarely middling sized, commonly .4–2 mm. in diameter, rounded or irregular, sometimes perforate, frequently clustered or conglomerate, or rarely solitary, flat and margined with lighter colored exciple, or more commonly convex and immarginate, from pale flesh-colored to pale brown, rarely somewhat pruinose. Hypothecium pale or cloudy. Hymenium pale throughout or slightly colored above. Paraphyses simple, the apex frequently thickened but showing little or no color. Asci clavate or cylindrico-clavate.

On rotting trunks, especially of conifers, but rarely also on other wood and dry humus. Plants from British America, New York, Virginia, Wisconsin and Louisiana are referred here by Dr. Wainio in his Monograph, and he has also determined the plant for the writer from Minnesota, where it is found on dead coniferous wood throughout the northern portion of the State. The "pale fruited form" of *Cladonia mitrula* distributed as No. 187, "Lichenes Boreali-Americani," seems quite close to the present species but on submitting the number to Dr. Wainio he agrees with authors of Lich. Bor. Amer. Known also in Europe and Asia. Plate VIII. Figs. 3 A and 3 B. *CLADONIA CAESPITICIA* (Pers.) Flk. Clad. Comm. 8. 1828.

Primary thallus persistent and composed of subdigitately-lacinate, incised or crenate, ascending flat or rarely involute squamules, which are middling sized, 2–10 mm. long and 1.5–8 mm. in width, commonly clustered and thus forming larger or smaller patches, sea-green varying toward whitish or olivaceous, the cortex continuous, frequently sorediate below where the color is white. Podetia arising from the surface of the primary thallus, abortive or 1–5 mm. long and .4–1.5 mm. in diameter, subcylindrical or clavate, cupless, simple or rarely branched, the apices obtuse and always bearing apothecia, usually ashy in color. Apothecia medium sized or larger, .75–3 mm. in diameter, at the apices of podetia or rarely sessile, solitary or slightly clustered, thinly margined or immarginate, flat or convex, brown or reddish-brown. Hypothecium pale. Hymenium pale below and pale or brownish above. Paraphyses simple, the apices enlarged and pale or brownish. Asci cylindrico-clavate.

On soil, usually sandy, or on rocks. Rarely on dead trunks in dry places. Examined by the writer from New York (E. A. Burt and Carolyn W. Harris), Ohio (E. E. Bogue and det. *Cladonia symphyocarpa epiphylla* by Dr. J. W. Eckfeldt), Iowa and Minnesota (Bruce Fink), and Newfoundland (A. C. Waghorne and called *Cladonia fimbriata* by Dr. F. Arnold). Reported from Alabama by Charles Mohr, from Montana by Mrs. Carolyn W. Harris, and from Massachusetts and Illinois by Henry Willey.

Wainio's Monograph adds to this distribution Tennessee and South Carolina. This gives a general distribution throughout North America, east of the Rocky Mountains, except in extreme regions. Known also in Europe, where also absent from arctic regions. Plate VIII. Figs. 1 A and 1 B.

CLADONIA DELICATA (Ehrh.) Flk. Clad. Comm. 7. 1828.

Primary thallus commonly persistent, composed of small lacinate, erose or crenate squamules 1-2.5 mm. long and wide, ascending, flat or involute, commonly clustered and frequently forming a crust, ashy, sea-green or olivaceous above, below white and usually more or less sorediate, the cortex continuous above. Podetia arising from the surface of the primary thallus, 3-10 mm. long .5-1 mm. in diameter, cupless, subcylindrical, clavate or irregularly turgescent, usually simple or slightly branched at the apex, but rarely quite freely branched lower down, the axils, the apices and the sides sometimes more or less fissured, scattered or clustered, erect, commonly more or less sorediate and decorticate, the apices usually apothecia-bearing and obtuse, but rarely sterile and subulate. Apothecia small, .3-1.5 mm. in diameter, borne in clusters or solitary at the apices of the podetia or branches, thinly margined or immarginate, flat or convex, brown or rarely reddish-brown. Hypothecium pale or pale-brownish. Hymenium brownish and darker above. Paraphyses simple or branched, the apices frequently thickened and pale-brownish. Asci clavate or cylindrico-clavate.

On rotting wood or on earth in swampy places. Examined by the writer from Massachusetts (E. A. Burt), Washington, D. C. (T. A. Williams), Ohio (H. L. Jones), and from Iowa and Minnesota (Bruce Fink). W. W. Calkins and Henry Willey both list it from Illinois, and J. Macoun from Quebec and Ontario. Wainio's Monograph adds Indiana, South Carolina, Alabama and Louisiana. This gives a North American distribution very similar to that of the last species. Known in all the grand divisions. Plate VIII, Figs. 2 A and 2 B.

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PLATE VII.—*Ptychomitrium Leibergii* n. sp. by Dr. G. N. Best in the BRYOLOGIST, September, 1906, page 81, should have contained the following magnifications: Fig. 1. Plant of *P. Leibergii*  $\times 2$ . Fig. 2. Same  $\times 22$ . Fig. 3. Leaf  $\times 22$ . Fig. 4. Base of leaf  $\times 240$ . Fig. 5. Apex of same  $\times 365$ . Fig. 6. Perichetial bud  $\times 42$ . Fig. 7. Calyptra  $\times 22$ . Fig. 8. Spores  $\times 650$ . Fig. 9. Peristomial teeth  $\times 240$ . All reduced  $\frac{1}{2}$ . The plant was named in honor of Mr. John B. Leiberg, not John F. as printed on page 60. Ed.

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Lichenology for Beginners (Sargent). A. M. S.....	17	Publisher Sargent's Work on Lichens .....	52
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Organography of Plants (Goebel) Elizabeth G. Britton. 10, 11, 12		Musci Acrocarpi Boreali-Americani (Holzinger). A. J. Grout.....	17, 24, 105
Publisher Dr. Schneider's Work on Lichens.....	52	North American Musci Pleurocarpi (Grout). Ed. B. Chamberlain.....	106

## ERRATA.

- Page 6, line 24, for 5-5 read 3-5.  
 Page 6, line 34, for Lindb. read Kindb.  
 Page 8, line 12, for SUBASPARRIMUM read SUBASPERRIMUM.  
 Page 21, line 1, for 8: 3, 1905, read 8: 37, 1905.  
 Page 26, line 9 from below, for *Spagna* read *Sphagni*.  
 Page 30, line 18, for *leucopheae* read *leucophaea*.  
 Page 32, lines 19 and 22, for *Selwini* read *Selwyni*.  
 Page 41, line 31, for Bottiaceae read Pottiaceae.  
 Page 42, line 9, for 1894 read 1904.  
 Page 42, line 13, for A. J. G., type read A. J. G.; and type.  
 Page 44, line 13, for *Tyloriae* read *Tayloriae*.  
 Page 45, line 22, for 41 read 141.  
 Page 49, line 6, for *furfuraceae* read *furfuracea*.  
 Page 51, line 7, for AUEANTIACUM read AURANTIACUM.  
 Page 58, line 39, for contex read cortex.  
 Page 58, line 45, for Asi read Asci.  
 Page 61, line 8, for 1 6 read 1:6.  
 Page 63, line 17, for *Lapidozia* read *Lepidozia*.  
 Page 64, line 4, for *accuminatum* read *acuminatum*.  
 Page 64, line 25, for *flagallare* read *flagellare*.  
 Page 64, line 32, for *scoparoides* read *scoparioides*.  
 Page 65, line 33, for *urnigarum* read *urnigerum*.  
 Page 65, line 38, for *piliforum* read *piliferum*.  
 Page 65, line 40, for *recurvens* read *recurvans*.  
 Page 66, line 7, for *quinquefarinum* read *quinquefarium*. Also same error page 72, line 25.  
 Page 72, line 32, insert are, before several.  
 Page 77, line 5, for *setacca* read *setacea*.  
 Page 80, line 21, for John F. Leiberg read John B. Leiberg.  
 Page 81, line 31, for *Physia* read *Physcia*.  
 Pages 84-86 for Li. Um. read Li. Un., *passim*.  
 Page 84, line 22, for margin read margine.  
 Page 86, line 25, for Luec. read Suec.  
 Page 86, line 33, for Scharer's read Schaerer's.  
 Page 86, line 35, for *valleus* read *velleus*.  
 Page 86, line 37, for U. vellea read *U. vellea*.  
 Page 91, last line, for page 60 read page 80.  
 Page 92, line 14, for Splachnae read Splachneae.  
 Page 102, line 3 from below, for S. C. Horrell read C. S. Horrell.  
 Page 103, line 12 from below, for spores read pores.